PLACER 28/ ENVIRONMENTAL IMPROVEMENT PROJECT (EIP)

Conceptual
Erosion Control and Revegetation Plan

Route 28 In Placer County
KP 0.8/9.3 10.2/11.0
(EA 2A9401/290901)

California Department of Transportation
Prepared by North Region Office of Landscape Architecture
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1. [i]INTRODUCTION

This Erosion Control/Revegetation plan is being prepared to satisfy the 401 Water Quality Certification and NPDES permit requirements of the Lahontan Regional Water Quality Control Board, Tahoe Regional Planning Agency, 404 permit conditions of U.S. Army Corps of Engineers and 1601 Streambed alteration conditions of California Department of Fish and Game. This project poses to widen shoulders, install asphalt concrete dikes, maintenance turnouts, left-turn lanes and pockets, rehabilitate existing drainage systems, install sand traps and infiltration basins. This conceptual plan identifies commitments Caltrans is proposing to 1) protect and minimize impacts to wetlands, SEZ's and vegetated areas during construction, 2) restore, revegetate and compensate for impacts to wetlands, drainages, SEZ's and vegetated areas disturbed by construction, and 3) monitor mitigation and revegetation results to ensure success.

The goals of the revegetation effort are to successfully reestablish vegetative cover within disturbed construction areas, provide long-term sediment control and the restoration, revegetation and compensation of wetlands, "waters" and SEZ's. Effective revegetation is also intended to minimize scenic impacts and in some cases improve scenic quality throughout the project limits, addressing TRPA "Scenic Threshold" requirements.

2. EROSION CONTROL/REVEGETATION PLAN

Revegetation and Erosion Control will involve the use of several techniques to reduce erosion and promote the reestablishment of native plant communities to areas impacted by construction activity. The following general techniques will be utilized as part of the construction project and the follow-up planting project:

- Minimize the removal of established vegetation and avoidance of trees.
- Removal and collection of the top 100mm of duff material (top soil and organics on the soil surface) during clearing and grubbing operations, to be used as soil amendment.
- Incorporate compost/duff to a depth of 12-18 inches in order to promote biological activity, root penetration and water holding capacity of disturbed soils.
- Use of additional soil amendments, compost and (slow release) organic fertilizer, to improve soil condition and provide nutrients for plant growth.
- Rip or cultivate compacted areas in order to improve water infiltration and root penetration.
- Extensive use of mulch for passive erosion control, derived from pine needles and chipped trees and shrubs removed by construction activities or collected from the project vicinity.
- Install a temporary irrigation system in selected locations (to be determined) in order to promote timely establishment of vegetation prior to winter conditions.
- Develop a revegetation palette based on environmental conditions such as slope, aspect and proximity to water.
- Revegetate all disturbed areas with genetically adapted seed and plant materials.
- Contour grade and place boulders to deter off shoulder parking that negatively impacts long-term establishment of vegetation.
- Incorporate trials into the revegetation areas to test the effectiveness of alternative treatments and site preparation methods.

3. CONSTRUCTION BEST MANAGEMENT PRACTICES: (PERMANENT EROSION CONTROL)

The following erosion control related activities will occur during the roadway/drainage construction phase.

Excavation, Embankment and other Disturbed Areas

Order	Activity
1.	Vegetation (within the defined work limits) will be removed and chipped (clearing and grubbing). Trees, shrubs and other woody debris less than 300 mm in diameter will be chipped and stockpiled. Trees larger than 300 mm will be limbed and stockpiled for later use as landscape features.
2.	The top 100mm of duff material (top soil and organic layer) will be harvested from cleared and grubbed areas and stockpiled for later use a soil amendment.
3.	New slopes and other disturbed areas will be contour graded in order to facilitate revegetation, minimize erosion and integrate newly constructed areas into surrounding natural landscape.
4.	Once grading is complete, disturbed areas will be ripped and/or cultivated. 100 mm of 'Duff' material (to the extent available) and compost will be incorporated into new excavation/ embankment slopes and denuded areas to a depth of 12" to 18". All other areas will receive 50 mm layer of duff over finished grade prior to seeding.
5.	Landscape boulders and logs will be strategically placed back into roadside areas in order to maximize visual integration to the surrounding natural landscape and to prevent automobiles from accessing selected areas.
6.	Final excavation/ embankment slopes and other disturbed areas will be roughened using a tracked vehicle to create an irregular surface to minimize potential for erosion.
7.	All disturbed areas will receive an application of Erosion Control Type 'D' which includes compost, fertilizer, seed and tackifier.
8.	All disturbed areas will be mulched with pine needles and chipped vegetation to a depth of 1".

Basins

Order	Activity
1.	Existing vegetation (within the defined work limits) will be removed and chipped (clearing and grubbing). Trees, shrubs and other woody debris less than 300 mm in diameter will be chipped and stockpiled. Trees larger than 300 mm will be limbed and stockpiled for later use as landscape features.
2.	The top 100mm of duff material (top soil and organic layer) will be harvested from cleared and grubbed areas and stockpiled for later use a soil amendment.
3.	Basin side slopes, berms and other modified areas will be constructed to minimize potential erosion problems and to integrate basins into surrounding natural landscape.
4.	Landscape boulders and logs will be strategically placed back around basins in order to maximize visual integration to the surrounding natural landscape.
5.	50 mm of 'Duff' material will be placed over disturbed areas and roughened using a tracked vehicle to create an irregular surface in order to minimize potential for erosion.
6.	All disturbed areas will receive an application of Erosion Control Type 'D' which includes compost, fertilizer, seed and tackifier.
7.	All disturbed areas will be mulched with pine needles and chipped vegetation to a depth of 1".
8.	Newly constructed channels, spillways and side slopes will receive erosion control blanket or 'Jute' netting in order to prevent erosion.
9.	Basin bottoms shall be ripped to remove compaction and improve infiltration.

4. WETLANDS, WATERS OF THE US AND STREAM ENVIRONMENT ZONE

Other Waters of the United States

Areas temporarily impacted by construction activities will be restored and revegetated. Drainage areas will be contour graded at the completion of work to restore topography and flow patterns.

Disturbed areas will be revegetated using the species present on site. Drainages will be planted primarily with native grasses and shrubs, similar to adjacent upland areas. However, where appropriate site conditions and hydrology are present, plantings will also incorporate mesic species, such as dogwood (*Cornus* sp.), wild rose (*Rosa woodsii* var. *ultramontana*), willow (*Salix* sp.), thimbleberry (*Rubus parviflorus*) and slender cinquefoil (*Potentilla gracilis*).

Projected Impacts: Waters Of The US (Source Caltrans NES, November 2003)

Resource	Resource ID	Area of Permanent Direct Impact	Permanent Fill Below OHWM
Jurisdictional Waters of the U.S. (ephemeral, intermittent, and perennial drainages below OHWM)	Tahoe SP Creek PM 0.75	0.005acre	0.93 Yd^3
	Tahoe SP Creek PM 0.84	0.005acre	0.93 Yd^3
	Burton Creek PM 1.53	0.005acre	1.11 Yd^3
	Burton Creek PM 1.61	0.005acre	0
	Barton Creek PM 1.64	0	0
	Barton Creek PM 1.66	0	0
	PM 1.81	0.011acre	2.03 Yd^3
	PM 1.86	0.009acre	1.67 Yd^3
	PM 1.91	0.009acre	1.67 Yd^3
	PM 1.94	0.005acre	1.11 Yd^3
	Lake Forest Creek PM 1.97	0.008acre	1.48 Yd^3
	Lake Forest Creek PM 2.05	0.007acre	1.48 Yd^3
	Lake Forest Creek PM 2.35	0.005acre	1.30 Yd^3
	Dollar Creek PM 3.50	0	0
	Cedar Flats Creek PM 4.10	0.004acre	1.30 Yd^3
	Watson Creek PM 5.16	0.003acre	0
	Carnelian Bay Creek PM 5.61	0.008acre	0.74 Yd^3
	Carnelian Canyon Creek PM 6.02	0	0
	Carnelian Canyon Creek PM 6.04	0.023acre	0
	Tahoe Vista Creek PM 8.89	0	0
	Total:	**0.112 acre**	**19.64 Yd^3**

Wetlands

Areas temporarily impacted by construction activities will be restored and revegetated. Wetland areas impacted will be contour graded at the completion of work to restore topography and ensure pre-project hydrology. Disturbed areas will be revegetated using the herbaceous wetland species currently found on-site. Wetland vegetation will also be planted in basins, throughout the project limits, where appropriate site conditions and hydrology are present. See page 9 for wetland plant species proposed.

Projected Impacts: Jurisdictional Wetlands (Source Caltrans NES, November 2003)

Jurisdictional Wetlands ("adjacent" to or isolated from areas below OHWM)	Resource ID	Area of Permanent Direct Impact (excluding "Jurisdictional Waters")	
	Tahoe-SP SEZ North (PM 0.76-0.91)	0.004acre	
	Burton SEZ South (PM 1.30-1.43)	0.034acre	
	Burton-SP SEZ North (PM 1.45-1.68)	0.009acre	
	Burton-SP SEZ South (PM 1.45-1.68)	0.003acre	
	Lake Forest SEZ North (PM 1.77-2.09)	0.033acre	
	Lake Forest SEZ South (PM 1.77-2.09)	0.005acre	
	Lake Forest SEZ North (PM 2.30)	0.00acre	
	Carnelian Bay SEZ South (PM 5.85)	0.00acre	
	Carnelian Bay SEZ South (PM 5.90)	0.00acre	
	Carnelian Canyon SEZ North and South (PM 6.00)	0.00acre	
	Tahoe Vista SEZ North and South (PM 8.81-9.00)	0.00acre	
	Kings Beach SEZ North (PM 9.30)	0.00acre	
	Total	**0.087 acre**	

Stream Environment Zones

1 ½:1 replacement of impacted SEZ's will be implemented by restoring and revegetating disturbed areas on site at a 1:1ratio. The additional ½:1 replacement will be achieved by enhancing or enlarging existing degraded SEZ's adjacent to the project limits. On-site replacement will be accomplished by contour grading at the completion of work to restore topography and ensure pre-construction hydrology. SEZ vegetation will be restored by seeding and planting disturbed areas using the herbaceous wetland and riparian species common to SEZ's (see page 9).

Projected Impacts: Stream Environment Zones (Source Caltrans NES, November 2003)

Stream Environment Zone (Jurisdictional areas inclusive)	Resource ID	Area of Permanent Direct Impact (Includes adverse and beneficial Impacts)	Area of Impervious Coverage Removal and/or Revegetation	Area of Additional Impervious Coverage
	Tahoe-SP SEZ North (PM 0.76-0.91)	300 ft^2	0 ft^2	10 ft^2
	Tahoe-SP SEZ South (PM 0.76-0.91)	500 ft^2	500 ft^2	0
	Burton SEZ South (PM 1.30-1.43)	1500 ft^2	1500 ft^2	0
	Burton-SP SEZ North (PM 1.45-1.68)	600 ft^2	500 ft^2	0
	Burton-SP SEZ South (PM 1.45-1.68)	300 ft^2	250 ft^2	0
	Lake Forest SEZ North (PM 1.77-2.09)	1600 ft^2	1000 ft^2	200 ft^2
	Lake Forest SEZ South (PM 1.77-2.09)	400 ft^2	300 ft^2	0
	Lake Forest SEZ North (PM 2.19-2.35)	2700 ft^2	2000 ft^2	0
	Dollar SEZ North (PM 3.40 –3.58)	0 ft^2	0 ft^2	0
	Dollar SEZ South (PM 3.40 –3.58)	0 ft^2	0 ft^2	0
	Cedar Flat SEZ North (PM (4.05-4.15)	200 ft^2	150 ft^2	0
	Cedar Flat SEZ South (PM (4.05-4.15)	200 ft^2	150 ft^2	0
	Watson SEZ North (PM 5.10-5.20)	300 ft^2	150 ft^2	0
	Watson SEZ South (PM 5.10-5.20)	200 ft^2	100 ft^2	0
	Carnelian Bay SEZ North (PM 5.50-5.65)	350 ft^2	200 ft^2	20 ft^2
	Carnelian Bay SEZ South (PM 5.50-5.65)	250 ft^2	150 ft^2	0
	Carnelian Canyon SEZ North (PM 5.90-6.15)	0 ft^2	0 ft^2	0
	Carnelian Canyon SEZ South (PM 5.90-6.15)	0 ft^2	0 ft^2	0
	Tahoe Vista SEZ North (PM 8.81-9.00)	0 ft^2	0 ft^2	0
	Tahoe Vista SEZ South (PM 8.81-9.00)	0 ft^2	0 ft^2	0
	Total	**9,400 ft^2 (0.216 acre)**	**6,950 ft^2 (0.160 acre)**	**230 ft^2 (0.005 acre)**

5. CONSTRUCTION MEASURES: AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES FOR WETLANDS, DRAINAGES AND SEZ'S

Restrict Timing of In-Stream Activities

To avoid direct impacts to surface water quality and fisheries, no work will be performed within a stream channel or wetland until flows are at their seasonal low or have ceased and the streambed is dry. As a guideline, no construction activities will be permitted below the OHWM between June 15th and October 15th, subject to stream conditions. No work or operation of equipment will occur in the wetted channel of any of the project drainages.

Establish Enviornmentally Sensitive Areas

Additional direct and indirect impacts to all vegetated areas, including sensitive biological resources, wetlands, streambeds, SEZ's and adjacent corridors will be avoided or minimized by designating these feature s outside the construction impacts area as "environmentally sensitive areas". ESA information will be shown on contract plans and discussed in the Special Provisions, and will be indicated as such in the field with the use of temporary orange fencing, and where appropriate silt fencing, installed as a first order of work. Contractor encroachment into ESA's will be restricted (including the staging/operation of heavy equipment or casting of excavation materials). Any damaged fencing will be repaired within one working day of discovery. ESA provisions will be implemented as a first order of work and will remain in place until construction activities are complete.

Containment Measures

Caltrans' Standard Specifications require the Contractor to submit a Water Pollution Control Plan. This plan must meet the standards and objectives to minimize water pollution impacts set forth in section 7-1.01G of Caltrans' Standard Specifications. These standards/objectives, at times referred to as Best Management Practices (BMP's). Measures will be employed to prevent any construction material, debris, or petroleum products associated with heavy machinery from entering surface waters or their channels. BMP's for erosion control will be implemented and in place prior to, during, and after construction in order to ensure that no silt, sediment or petroleum products enters surface waters.

Limit Vegetation Removal

Vegetation removal shall be limited to the absolute minimum amount required for construction.

De-Watering Activities

Depending on seasonal flows, de-watering of the streambed or culvert course and or a temporary stream diversion may be necessary where culvert rehabilitation or replacement is proposed. All de-watering activities will observe water quality measures listed above, as well as any permit-related restrictions. Any intakes that may be required for water pumps associated with wetting/ irrigation/ de-watering of sites shall be screened to RWQCB specifications to avoid the intake of fish. If de-watering of the site is deemed necessary, a temporary sediment-settling basin will be constructed downstream of the activity. All discharge waters associated with the de-watering activities will be pumped into the constructed basin before being allowed to re-enter project area drainages.

Weed Free Erosion Control Treatments
To further minimize the risk of introducing additional non-native species into the area, only locally TRPA-approved plant species appropriate for the project area will be used in any erosion control or revegetation seed mix or stock. No dry-farmed straw will be used, and certified weed-free straw shall be required where erosion control straw is to be used. In addition, any hydro-seed mulch used for revegetation activities must also be certified weed-free.

Weed Free Construction Equipment
All off-road construction equipment to be cleaned of potential noxious weed sources (mud, vegetation) before entry the project area (preferably before entry into the Lake Tahoe basin), and after entering a potentially infested area before moving on to another area, to help ensure noxious weeds are not introduced into the project area. The contractor shall employ whatever cleaning methods (typically with the use of a high-pressure water hose) are necessary to ensure that equipment is free of noxious weeds. Equipment shall be considered free of soil, seeds, and other such debris when a visual inspection does not disclose such material. Disassembly of equipment components or specialized inspection tools is not required. Equipment washing stations shall be placed in areas that afford easy containment and monitoring (preferably outside of the Lake Tahoe basin), and that do not drain into the forest or sensitive (riparian, SEZ, wetlands, etc.) areas.

Equipment Staging in Weed Free Areas
Staging of equipment should only be done in weed free areas. Landings should be placed in forested areas rather than open flats to help prevent the establishment of noxious invaders such as yellow star thistle, which utilize open sunny areas.

6. REVEGETATION PLAN

Revegetation Planting
Revegetation planting will occur simultaneously to the roadway/drainage construction project. The revegetation effort will install live container plantings of native species to supplement the erosion control seeding and aid the restoration of the project area. It will also fulfill Caltrans mitigation requirements for wetlands, drainages and SEZ's. The species proposed for planting are those indigenous in or adjacent to the project areas. The mix or composition of species will be determined based on post construction habitat conditions and will be defined by upland, wetland, drainage and SEZ. Plant layout will replicate existing vegetative patterns found in adjacent undisturbed areas. Basin side slopes and spillways will also be revegetated; these areas will be planted with species characteristic of seasonally wetter conditions.

Implementation Schedule
Revegetation activities will begin the year of construction. Container planting will be required during construction phases as areas are finished and prior to the end of each construction season. Planting will occur in late summer or early fall each year of construction, then each spring and fall in the following 1-2 seasons after construction depending on plant survival and cover. This phased planting approach is proposed to 1) ensure that areas are revegeteted in a timely manner and 2) adaptive management techniques can be employed to focus revegetation efforts at appropriate locations.

Species
Supplemental seed and container plants used on the project will be derived from genetic stock originating from the Tahoe Basin or vicinity of the same elevation and habitat conditions. The following is a list of species proposed for use in revegetation:

Proposed Container Material

Upland Vegetation Species

Botanical Name	Common Name
Achnatherum occidentalis var. californica	Mountain Needlegrass
Amelanchier alnifolia	Service Berry
Arctostaphylos patula	Greenleaf Manzanita
Artemesia tridenta	Sagebrush
Chrysothamnus nauseosus	Rabbit Brush
Elymus elymoides	Squirreltail
Pinus contorta var. murrayana	Lodgepole Pine
Pinus jeffreyi	Jeffrey Pine
Purshia tridenta	Antelope Bush
Ribes nevadense	Sierra Current
Wyethia mollis	Mules Ears
Symphoricarpos mollis	Snow Berry

Drainages and Wetlands Species

Botanical Name	Common Name
Agrostis idahoensis	**Idaho Bentgrass**
Carex amplifolia	**Sedge**
Carex utrculata	Sedge
Carex nebrascensis	Nebraska Sedge
Cornus sericea	Dogwood
Dechampsia cespitosa	Tufted Hairgrass
Geum macrophylum	Geum
Hordeum brachyantherum	Meadow Barley
Juncus balticus	Rush
Juncus effuses	Rush
Potenilla gracilis	Slender Cinquefoil
Rosa woodsii var. ultramontane	Mountain Rose
Salix sp.	Willow
Sidalcea oregona	Spicate Checker Broom

Erosion Control Seed Mix

Botanical Name	Common Name
Achnatherum occidentalis var. californica	Mountain Needlegrass
Agrostis idahoensis	**Idaho Bentgrass**
Elymus elymoides	Squirreltail
Elymus glaucus	Blue Wildrye
Bromus carinatus	California Brome
Lotus purshianus	Purshings Lotus
Lupinus grayii	Gray Lupine
Lupinus breweri	Brewer's Lupine
Achillea millifolium	Yarrow

Mulch
Mulch material will be generated from two sources. From vegetation removed and chipped during clearing and grubbing operations and from pine needles collected in the Tahoe Basin. The goal is to have a 50% pine needle to 50% chipped vegetation blend. If mulch generated from chipping woody debris is not adequate to fulfill the specifications, then additional pine needle material will be purchased. No straw mulch will be used on the project in the erosion control seeding.

Planting Densities
Grass, forb and wetland plugs will be clustered in groups on 1-foot centers, either alone or associated with shrub and tree plantings. Shrubs and trees will be planted on 1-2m centers. The planting design proposes to group plantings, within disturbed areas based on existing vegetation patterns found in the surrounding landscape. In general groupings will be composed of 60% grass and forb plugs, 30% shrubs, and 10% trees.

Watering
Plants will be watered in at planting and will be watered until the onset of rains or winter dormancy. Supplemental watering will be provided over the first summer and fall (after each planting) using a combination of remote temporary irrigation system and /or truck watering. Regular monitoring will be performed to ensure plants have adequate moisture.

Success Criteria
Prior to construction, vegetation composition, and cover will be characterized from reference sites outside the limits of the work area. The results will serve as the success criteria or goal for the mitigation project for each of the 4 habitat types (upland, wetland, drainage and SEZ).

First year success criteria will be achieved if the following conditions are met:

1. Soil surface is stabilized. No observed slope failures, soil movement or drainage erosion.
2. Total cover (cover from seed, plantings and mulch) is 95% or greater.
3. No areas greater than 3 x 3 meters without established plants.

Second through five year success criteria are met if :

1. Continual increases in plant cover are documented.
2. All target species are present on-site.

Monitoring Plan and Schedule
Qualitative and quantitative monitoring will be performed. Qualitative monitoring will involve visually inspecting the project for plant establishment and growth, as well as, for problems, such as erosion, drainage, weeds or plant mortality. Inspections will occur numerous times over the first year (minimum of 8 visits during the growing season), with a minimum of 2 visits years 2 - 5 (as long as no problems arise). Results will be documented on aerials or project plans. Permanent photo points will be set up to document the revegetation effort. Quantitative monitoring will occur once each year between April and August, for a period of five years. Quantitative sampling will be performed to estimate species richness, and plant cover.

Remedial Actions
If success criteria are not met, an additional planting effort will be implemented to meet requirements. However, prior to initiating any new planting, soil data, site preparation, planting techniques and materials will be evaluated. Caltrans will coordinate with the permitting agencies to determine appropriate remedial actions.